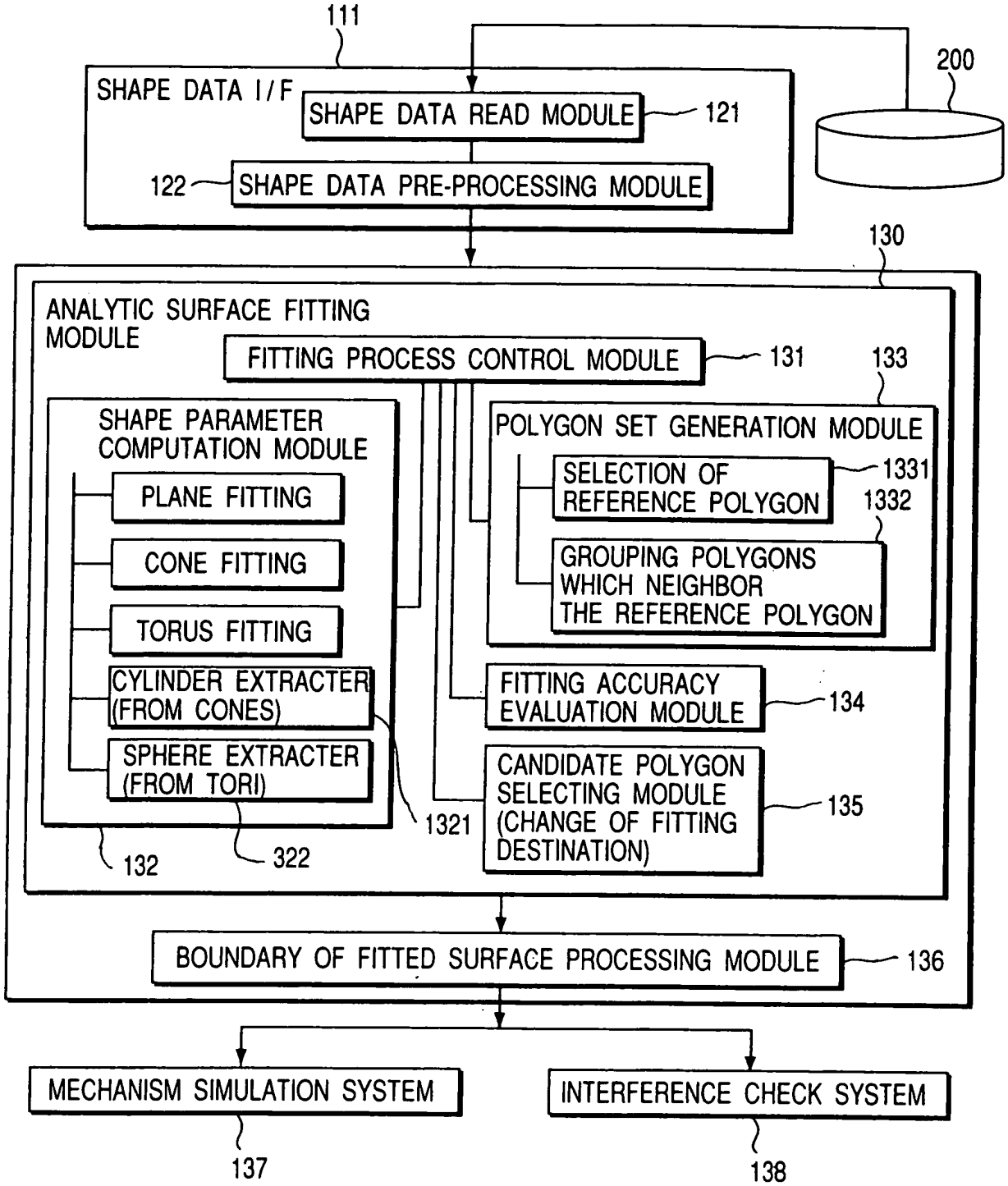

111
SHAPE DATA I/F
SHAPE DATA READ MODULE
121
122
SHAPE DATA PRE-PROCESSING MODULE
200
130
ANALYTIC SURFACE FITTING MODULE
FITTING PROCESS CONTROL MODULE
131
133
SHAPE PARAMETER COMPUTATION MODULE
PLANE FITTING
CONE FITTING
TORUS FITTING
CYLINDER EXTRACTER (FROM CONES)
SPHERE EXTRACTER (FROM TORI)
POLYGON SET GENERATION MODULE
SELECTION OF REFERENCE POLYGON
1331
1332
GROUPING POLYGONS WHICH NEIGHBOR THE REFERENCE POLYGON
FITTING ACCURACY EVALUATION MODULE
134
CANDIDATE POLYGON SELECTING MODULE (CHANGE OF FITTING DESTINATION)
135
1321
132
322
BOUNDARY OF FITTED SURFACE PROCESSING MODULE
136
MECHANISM SIMULATION SYSTEM
137
INTERFERENCE CHECK SYSTEM
138

FIG. 1

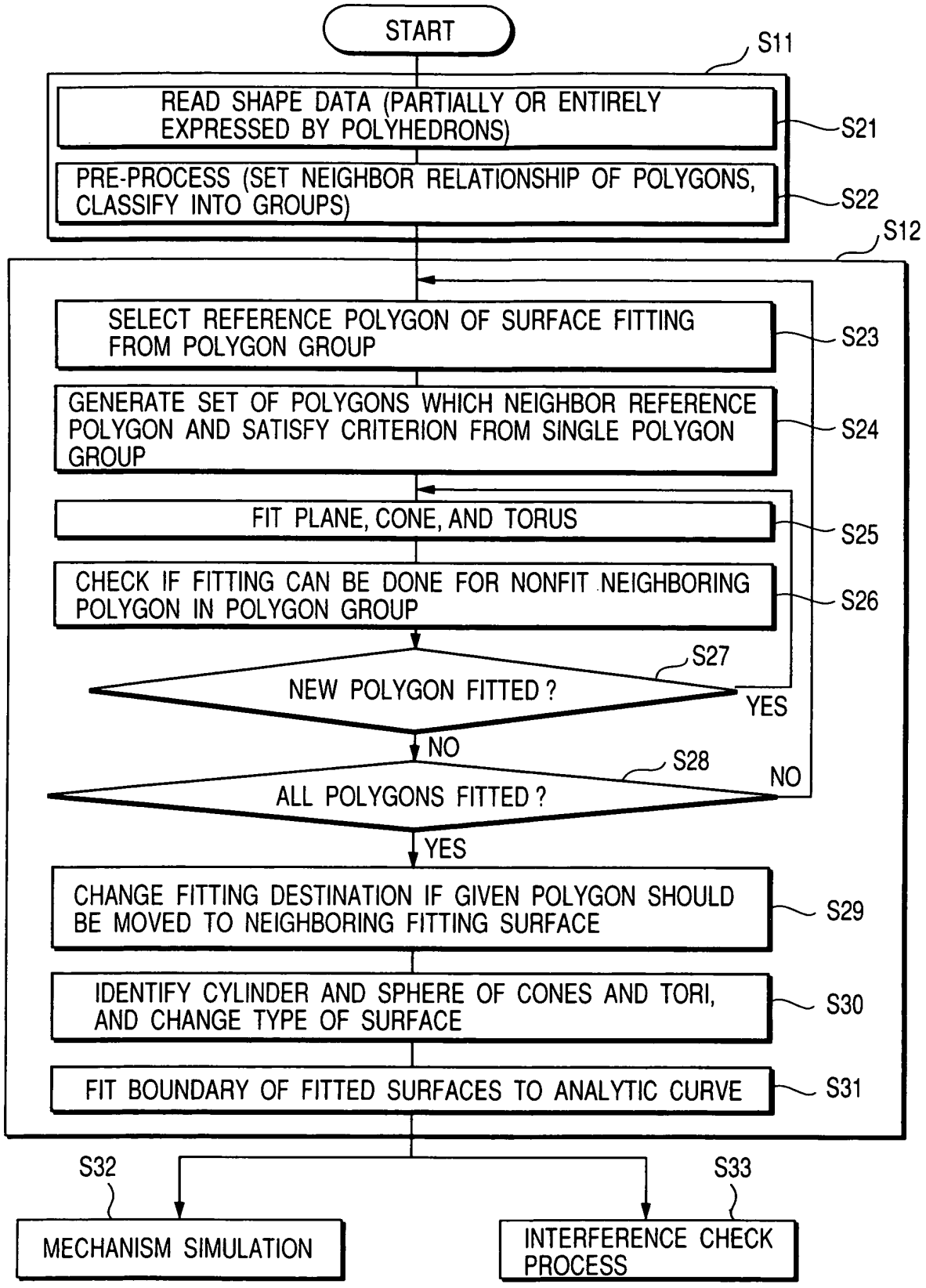
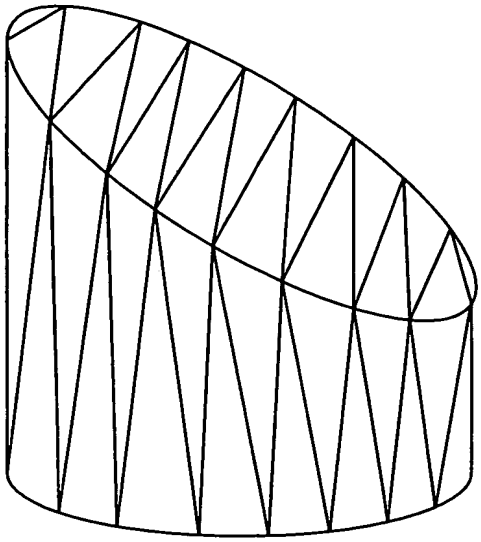

START
S11
READ SHAPE DATA (PARTIALLY OR ENTIRELY EXPRESSED BY POLYHEDRONS)
S21
PRE-PROCESS (SET NEIGHBOR RELATIONSHIP OF POLYGONS, CLASSIFY INTO GROUPS)
S22
S12
SELECT REFERENCE POLYGON OF SURFACE FITTING FROM POLYGON GROUP
S23
GENERATE SET OF POLYGONS WHICH NEIGHBOR REFERENCE POLYGON AND SATISFY CRITERION FROM SINGLE POLYGON GROUP
S24
FIT PLANE, CONE, AND TORUS
S25
CHECK IF FITTING CAN BE DONE FOR NONFIT NEIGHBORING POLYGON IN POLYGON GROUP
S26
S27
NEW POLYGON FITTED ?
YES
NO
S28
ALL POLYGONS FITTED ?
NO
YES
CHANGE FITTING DESTINATION IF GIVEN POLYGON SHOULD BE MOVED TO NEIGHBORING FITTING SURFACE
S29
IDENTIFY CYLINDER AND SPHERE OF CONES AND TORI, AND CHANGE TYPE OF SURFACE
S30
FIT BOUNDARY OF FITTED SURFACES TO ANALYTIC CURVE
S31
S32
S33
MECHANISM SIMULATION
INTERFERENCE CHECK PROCESS

FIG. 2

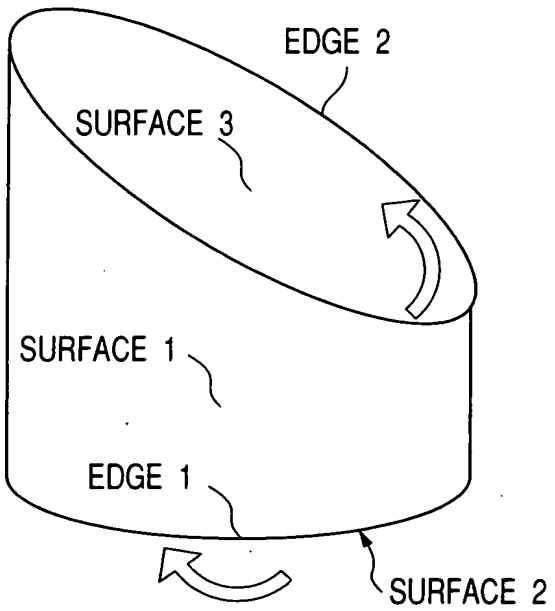


VERTEX COORDINATES OF ALL TRIANGLES AND DATA DEFINING TRIANGLES

VERTEX
1 (0,30,0) // ID NUMBER AND COORDINATE OF VERTEX
2 (30,0,0)
•
•

POLYGON
(1,2,3) // ID NUMBER OF VERTEX OF TRIANGLE
(1,2,5)
•
•

FIG. 3



SURFACE 1 : CYLINDER
CENTER (0,0,0)
AXIS (0,0,1)
RADIUS 30
CONTOUR EDGE 1 (RIGHT) , EDGE 2 (RIGHT)
SURFACE 2 : PLANE
POINT (0,0,0)
NORMAL (0,0,-1)
CONTOUR EDGE 1 (LEFT)
SURFACE 3 : PLANE
POINT (0,0,50)
NORMAL (0.7071,0,0.7071)
CONTOUR EDGE 2 (LEFT)
EDGE 1 : ARC
CENTER (0,0,0)
AXIS (0,0,-1)
RADIUS 30
ENDPOINT 1 (30,0,0)
ENDPOINT 2 (30,0,0)
EDGE 2 : ELLIPSE
POINT (0,0,50)
AXIS (0.7071,0,0.7071)
RADIUS 42.42640687,30
MAJOR AXIS (0.7071,0,-0.7071)
ENDPOINT 1 (0,30,50)
ENDPOINT 2 (0,30,50)

FIG. 4

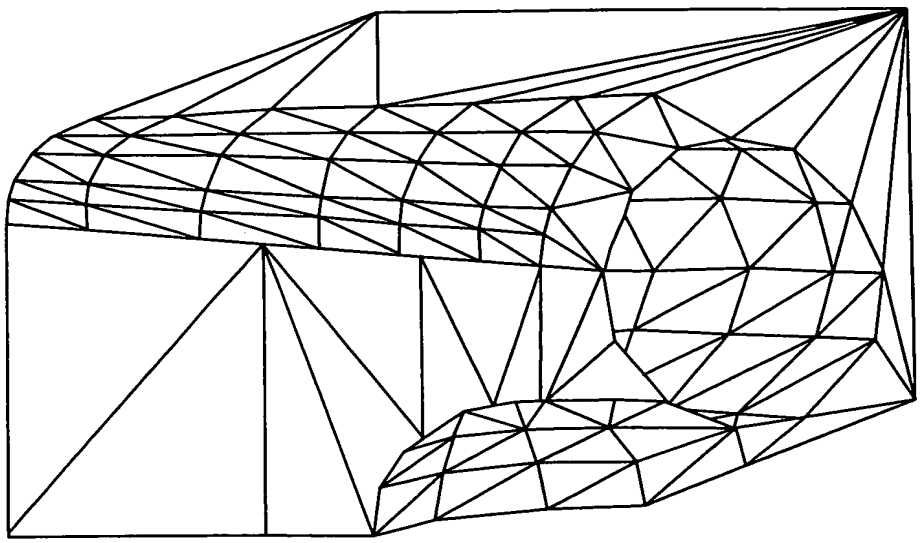


FIG. 5

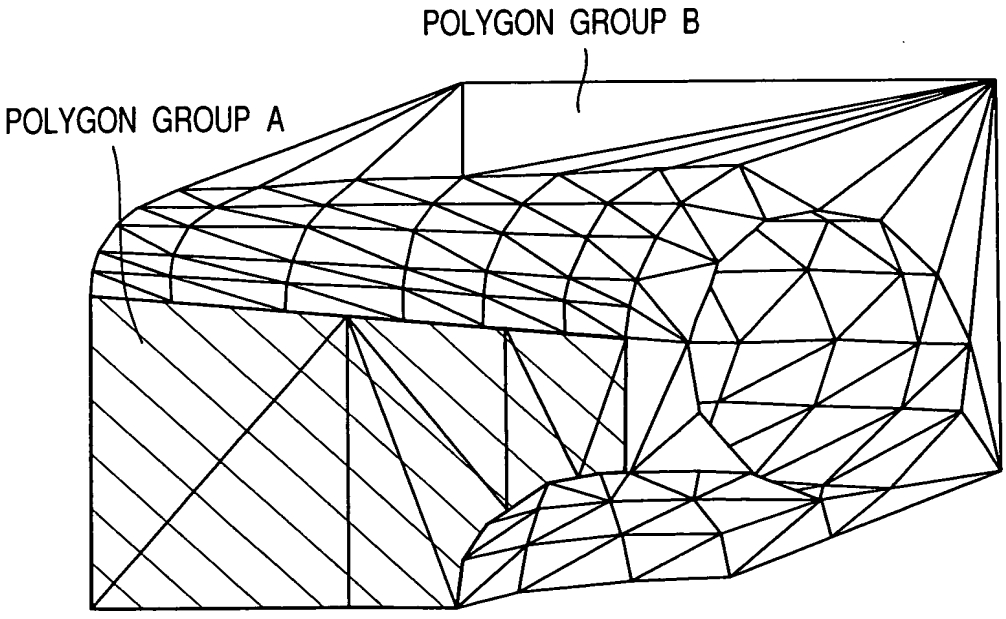


FIG. 6

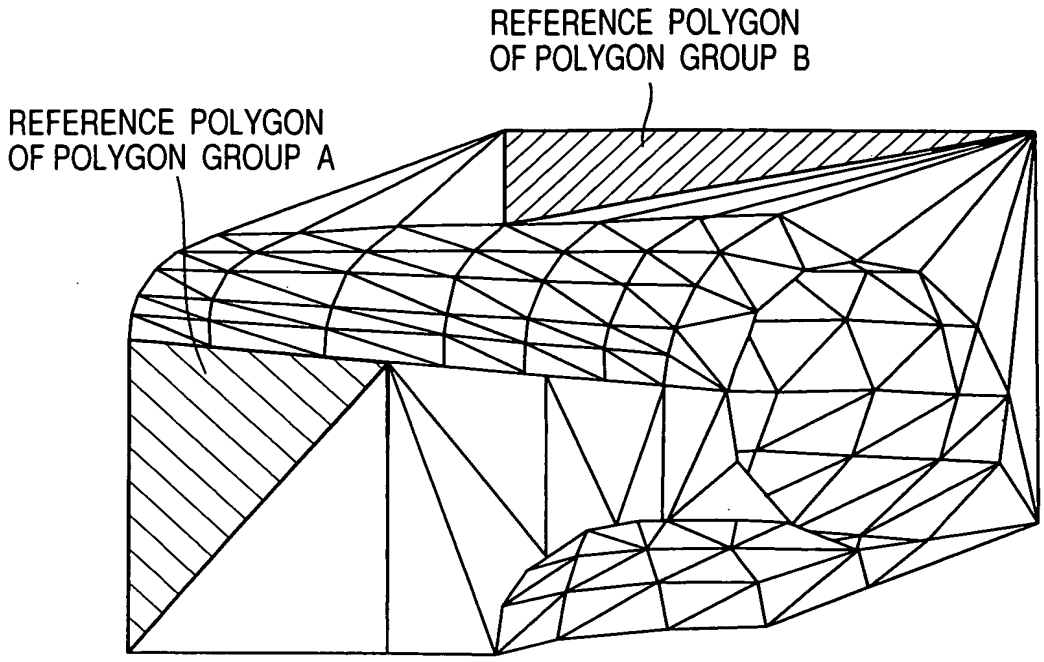

REFERENCE POLYGON
OF POLYGON GROUP B
REFERENCE POLYGON
OF POLYGON GROUP A

FIG. 7

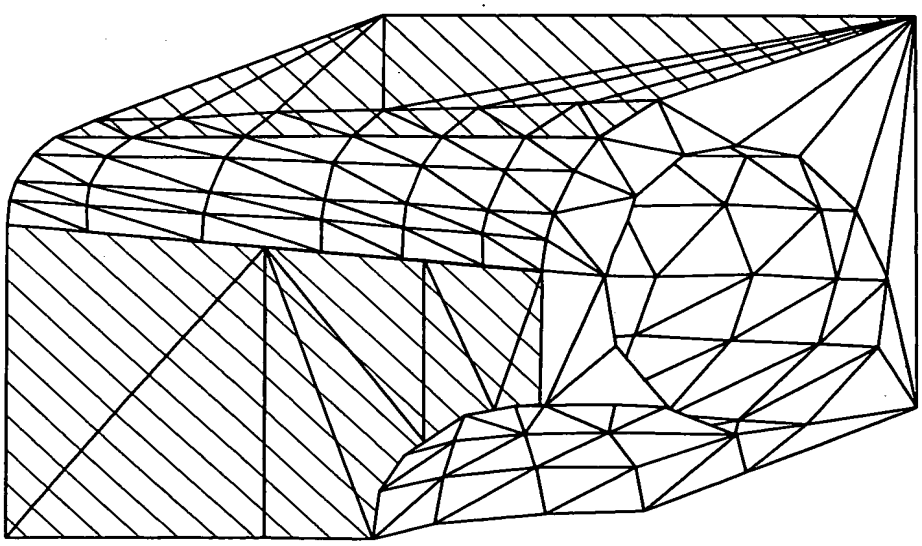


FIG. 8

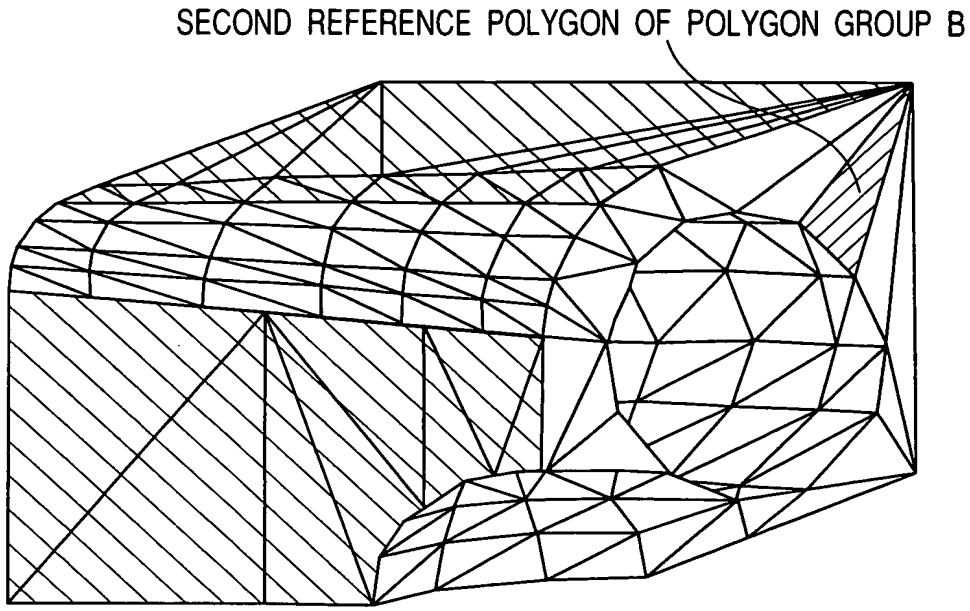


FIG. 9

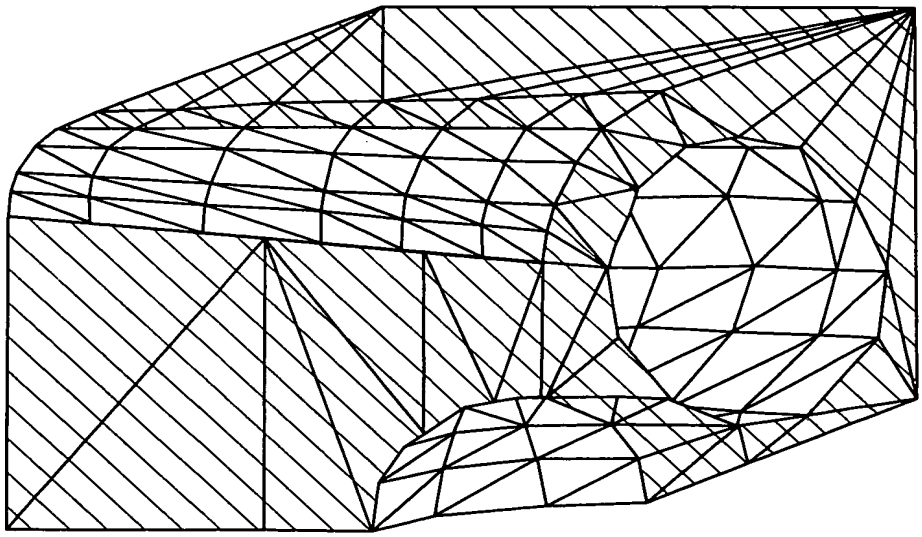


FIG. 10

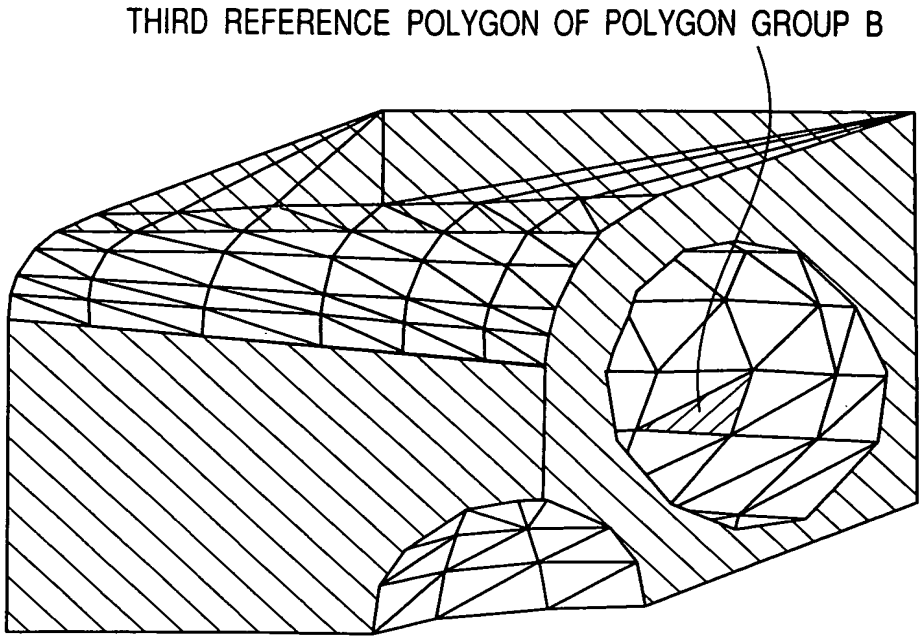

THIRD REFERENCE POLYGON OF POLYGON GROUP B

FIG. 11

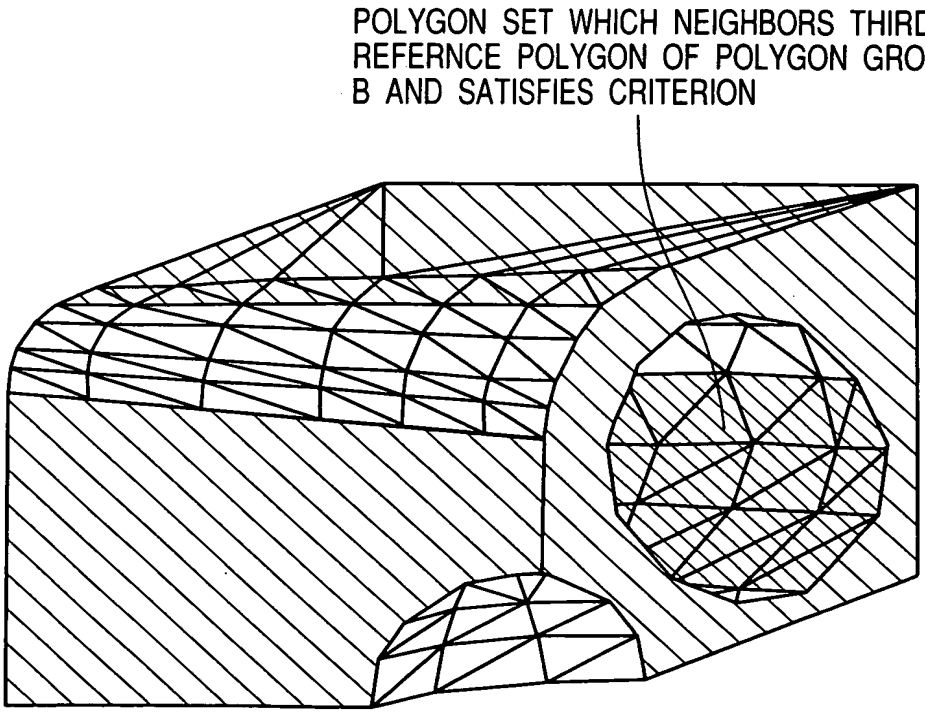

POLYGON SET WHICH NEIGHBORS THIRD REFERNCE POLYGON OF POLYGON GROUP B AND SATISFIES CRITERION

FIG. 12

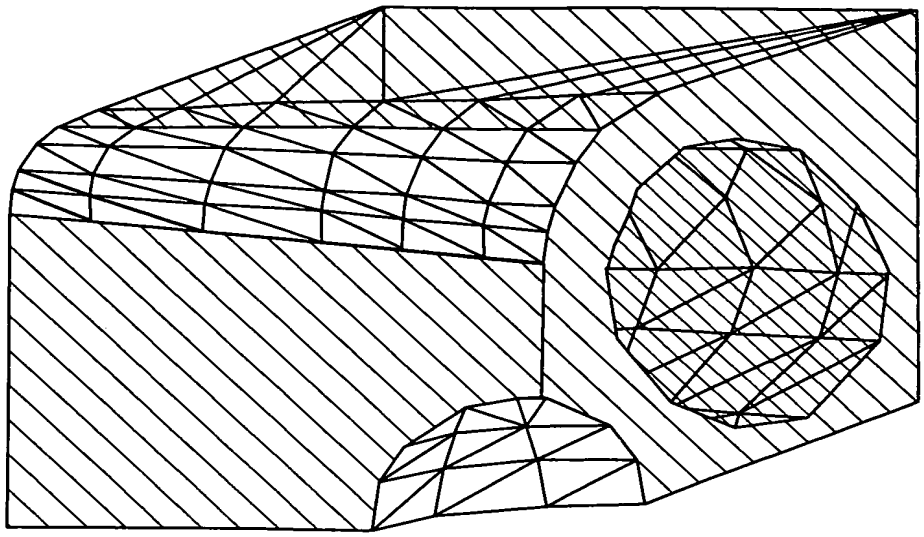


FIG. 13

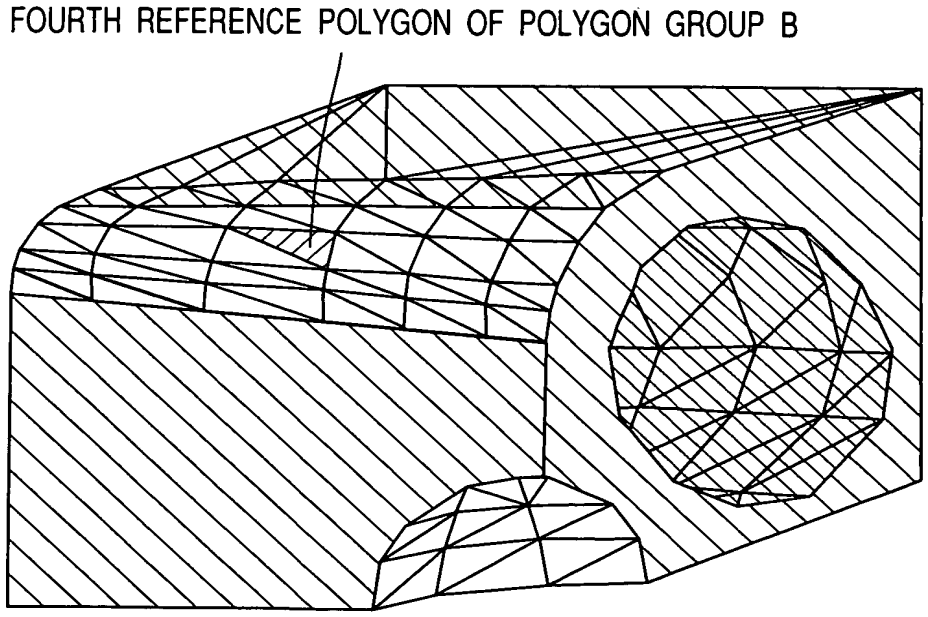


FIG. 14

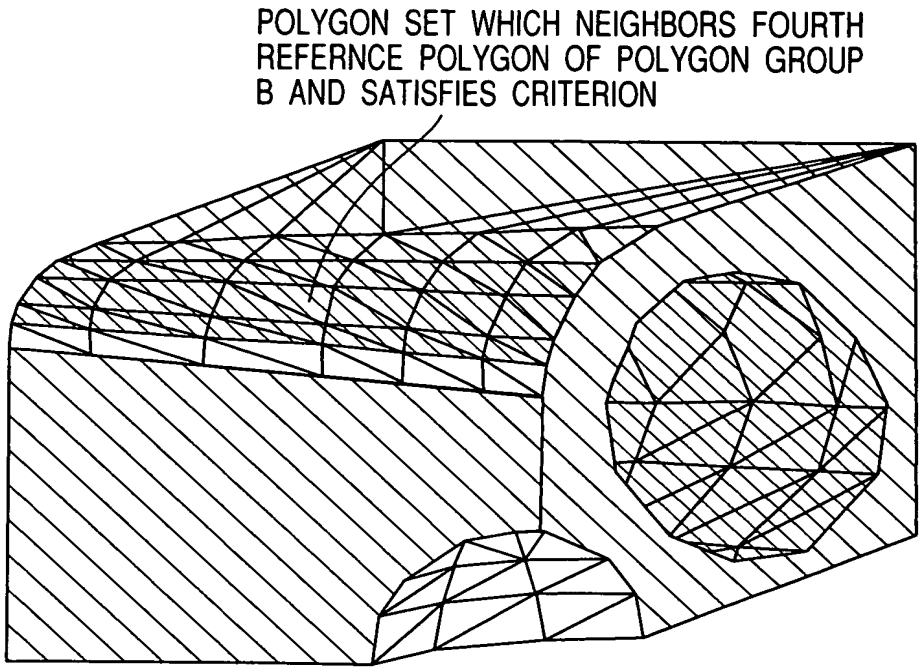

POLYGON SET WHICH NEIGHBORS FOURTH REFERNCE POLYGON OF POLYGON GROUP B AND SATISFIES CRITERION

FIG. 15

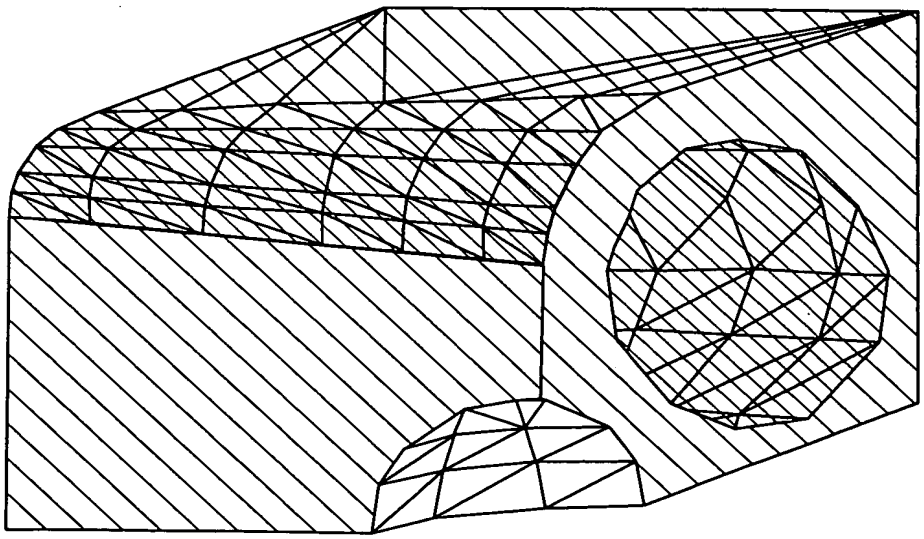


FIG. 16

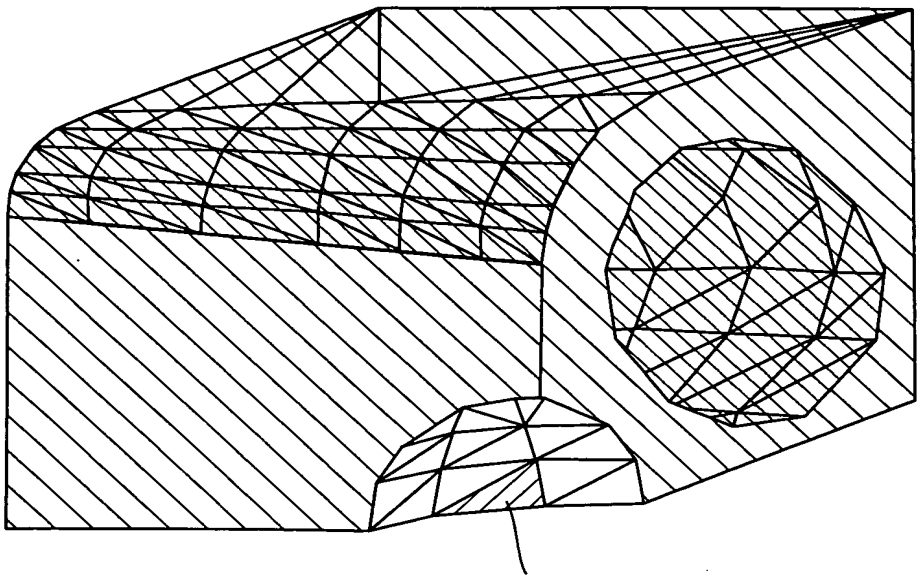


FIG. 17

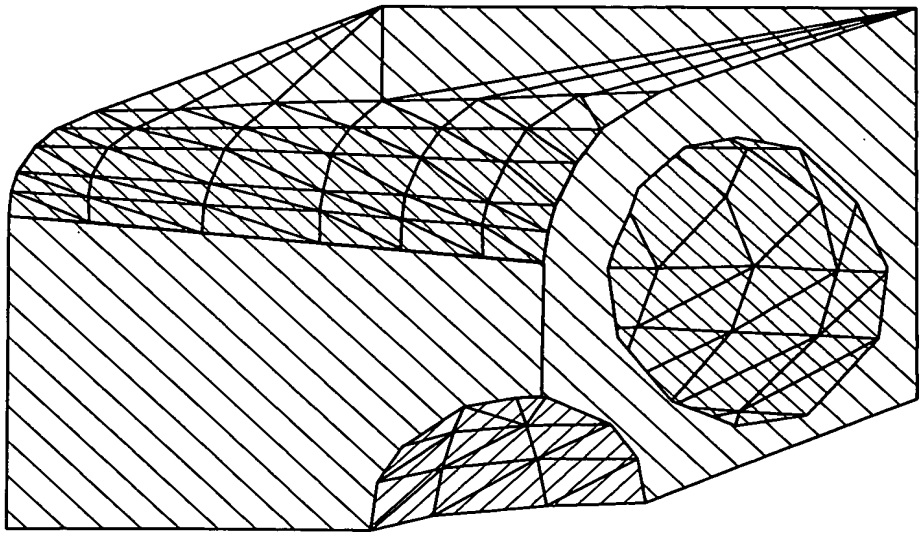


FIG. 18

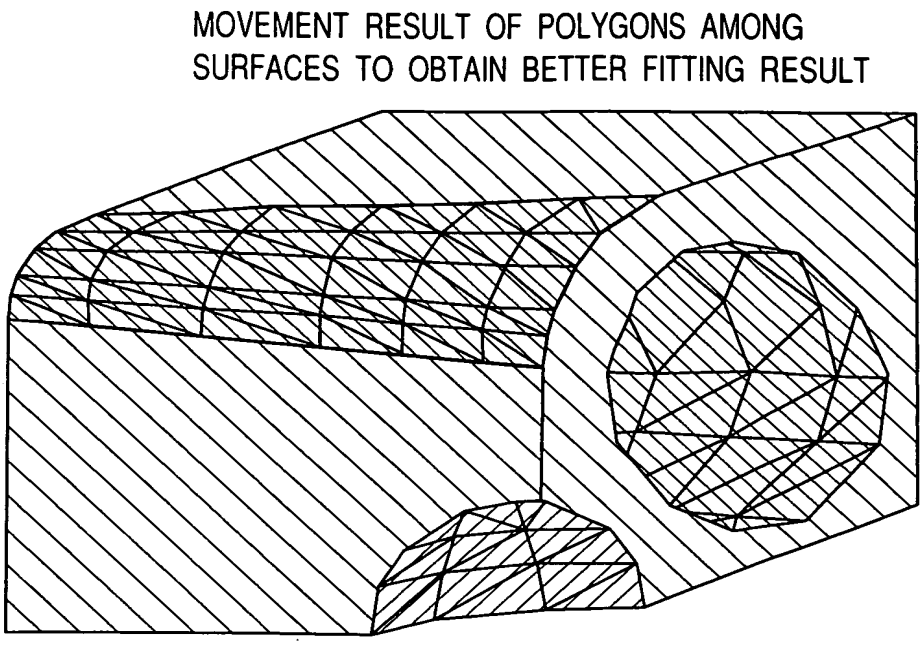

MOVEMENT RESULT OF POLYGONS AMONG
SURFACES TO OBTAIN BETTER FITTING RESULT

FIG. 19

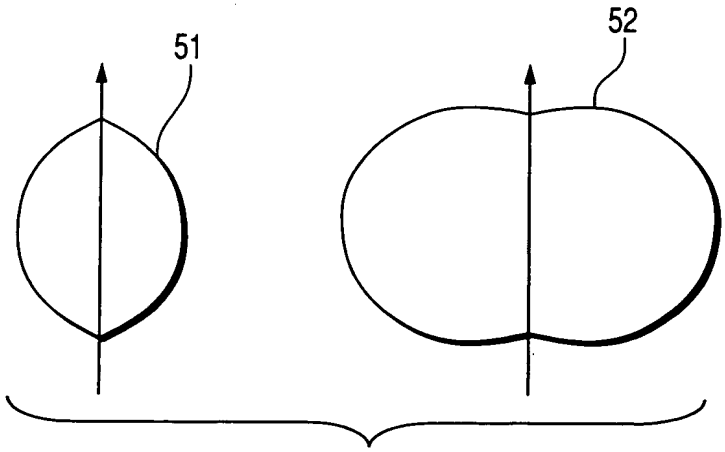

51
52

FIG. 20

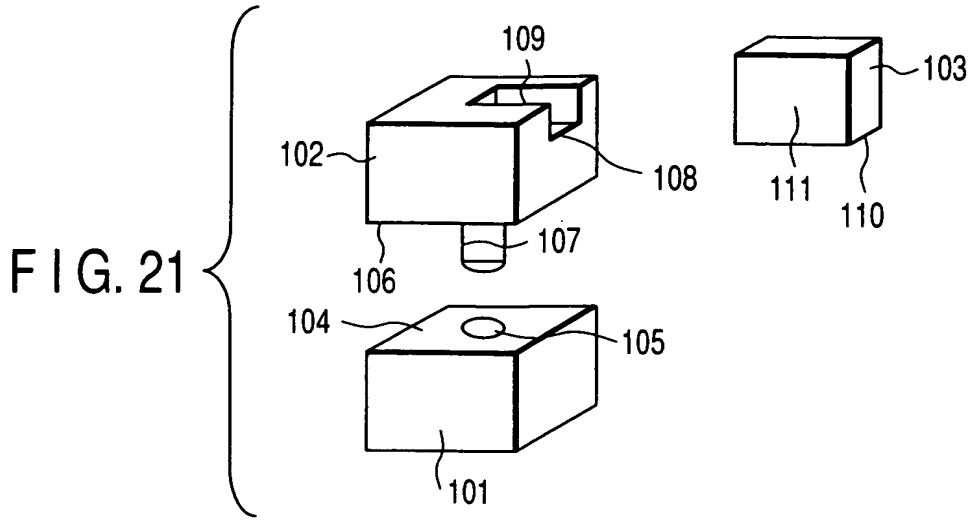


FIG. 21

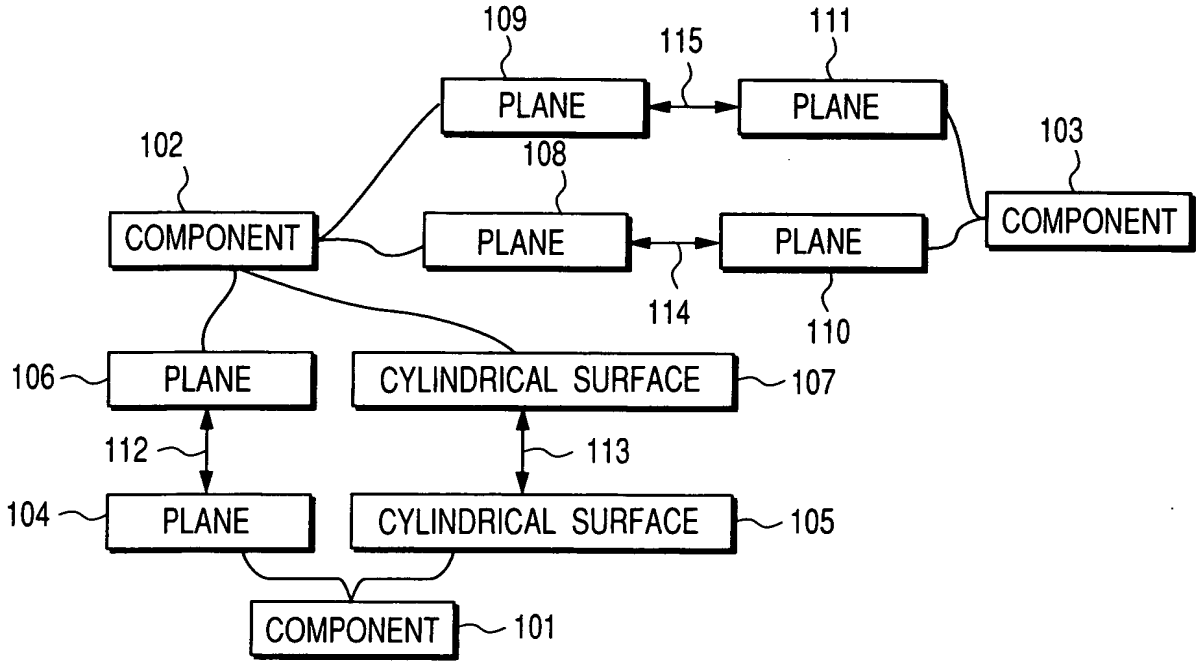


FIG. 22

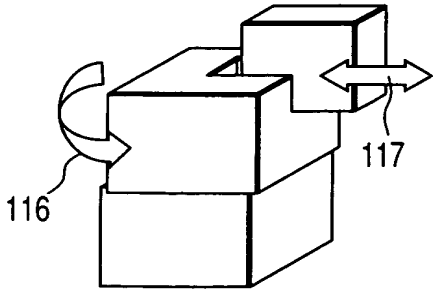


FIG. 23

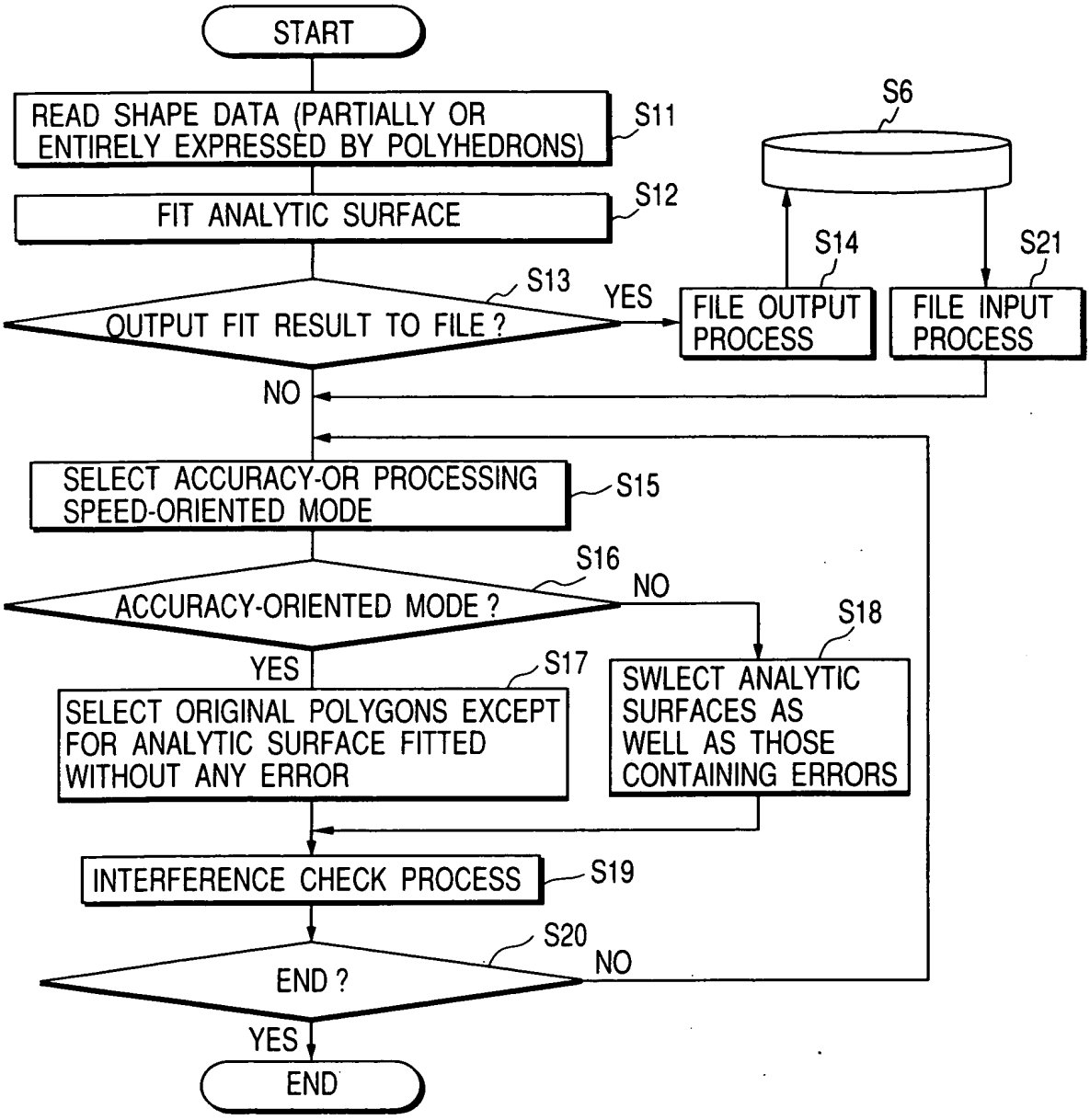

START
READ SHAPE DATA (PARTIALLY OR ENTIRELY EXPRESSED BY POLYHEDRONS)
S11
FIT ANALYTIC SURFACE
S12
OUTPUT FIT RESULT TO FILE ?
S13
YES
NO
S6
S14
S21
FILE OUTPUT PROCESS
FILE INPUT PROCESS
SELECT ACCURACY-OR PROCESSING SPEED-ORIENTED MODE
S15
ACCURACY-ORIENTED MODE ?
S16
NO
YES
S17
S18
SELECT ORIGINAL POLYGONS EXCEPT FOR ANALYTIC SURFACE FITTED WITHOUT ANY ERROR
SWLECT ANALYTIC SURFACES AS WELL AS THOSE CONTAINING ERRORS
INTERFERENCE CHECK PROCESS
S19
END ?
S20
NO
YES
END

FIG. 24

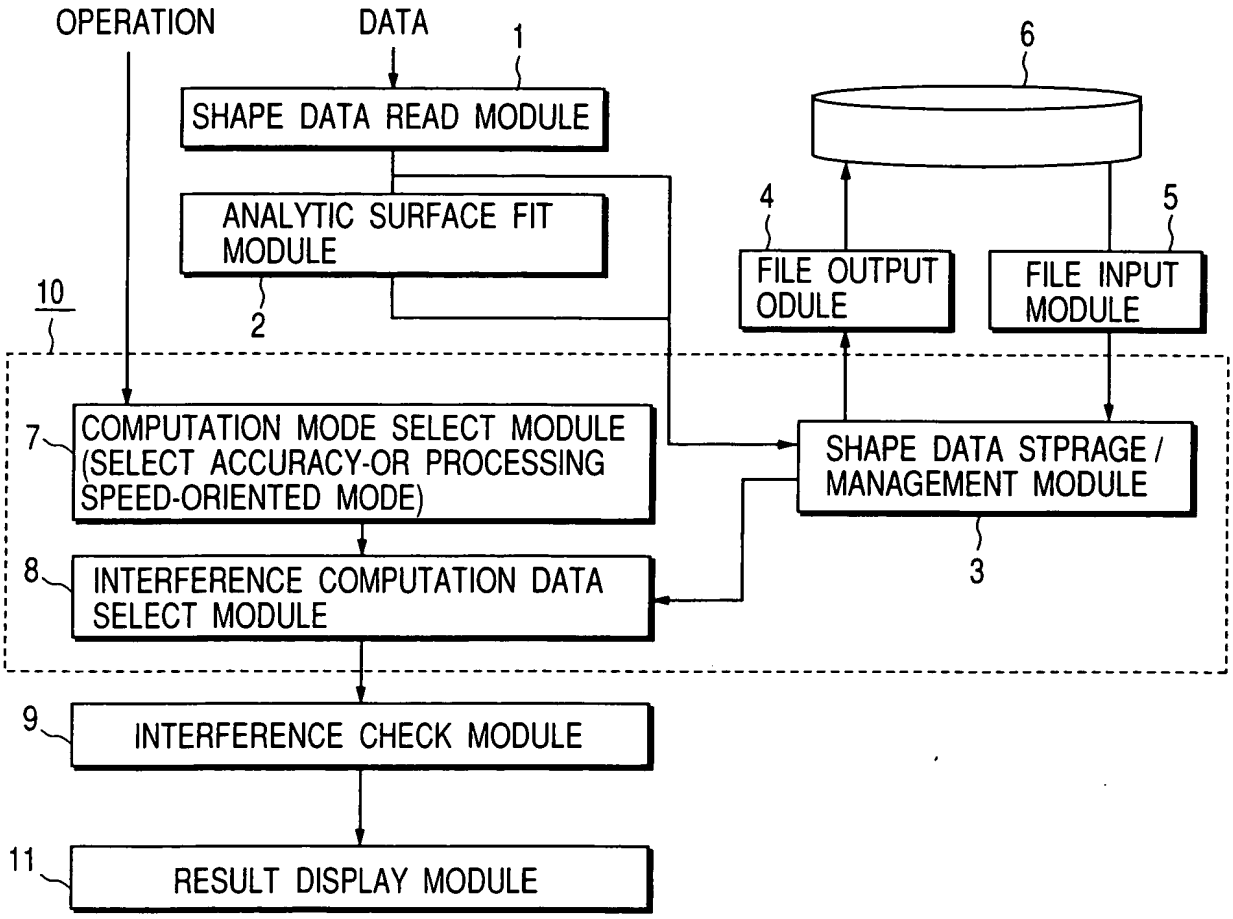

OPERATION
DATA
1
SHAPE DATA READ MODULE
ANALYTIC SURFACE FIT MODULE
2
10
6
4
5
FILE OUTPUT ODULE
FILE INPUT MODULE
7
COMPUTATION MODE SELECT MODULE (SELECT ACCURACY-OR PROCESSING SPEED-ORIENTED MODE)
SHAPE DATA STPRAGE / MANAGEMENT MODULE
3
8
INTERFERENCE COMPUTATION DATA SELECT MODULE
9
INTERFERENCE CHECK MODULE
11
RESULT DISPLAY MODULE

FIG. 25

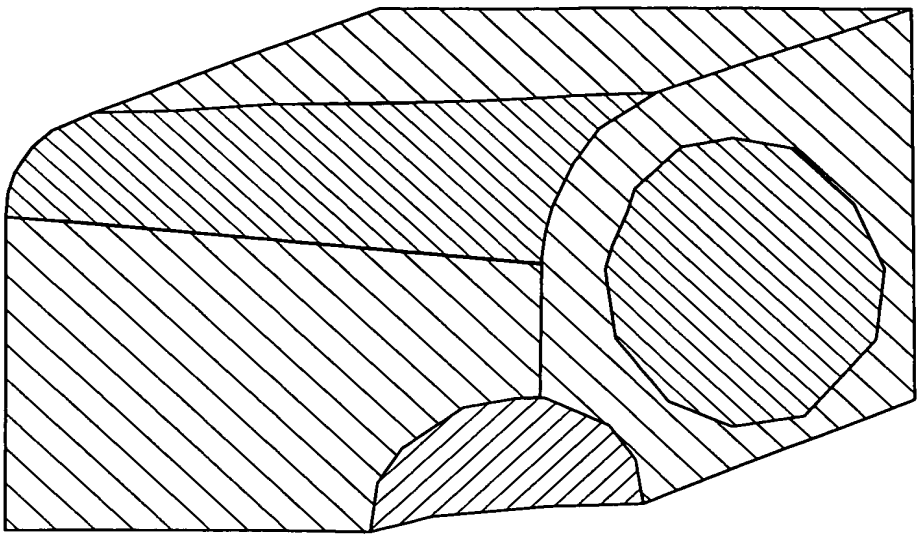


FIG. 26

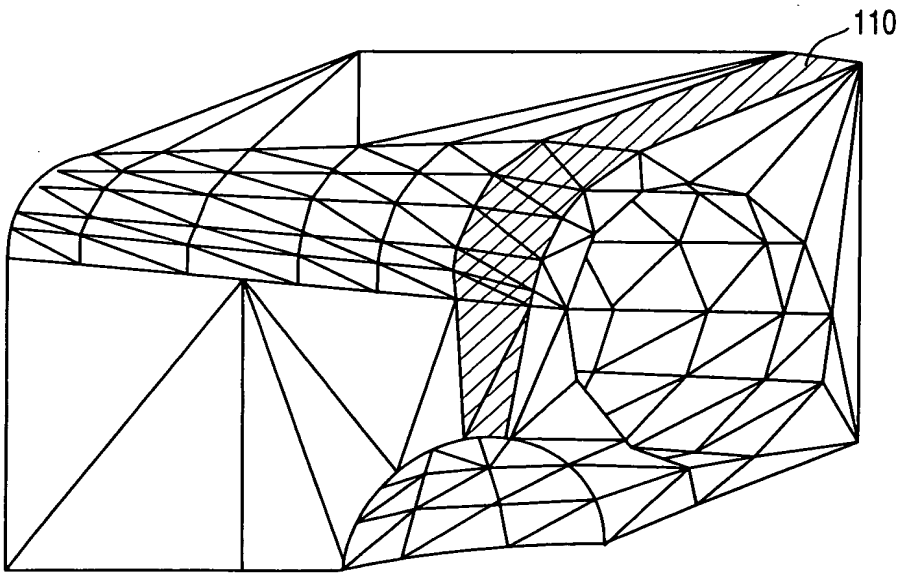


FIG. 27

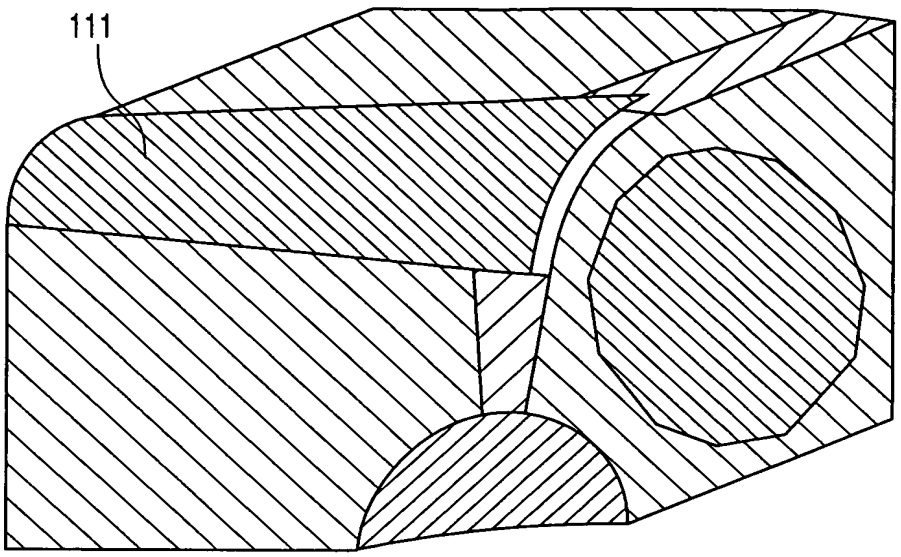


FIG. 28

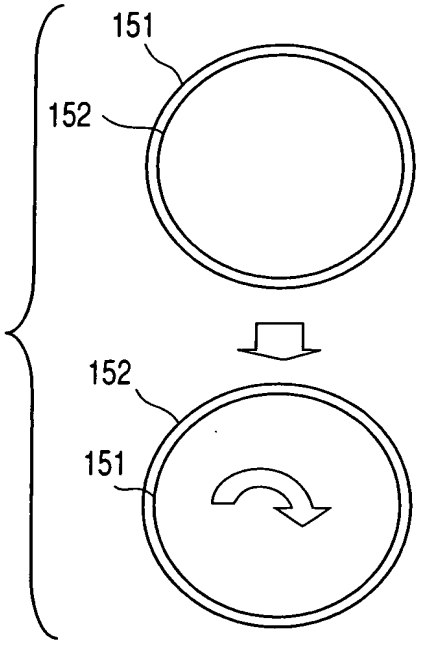


FIG. 29A

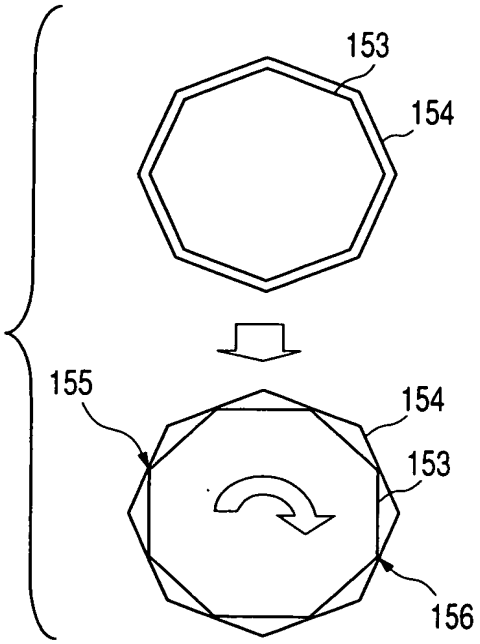


FIG. 29B

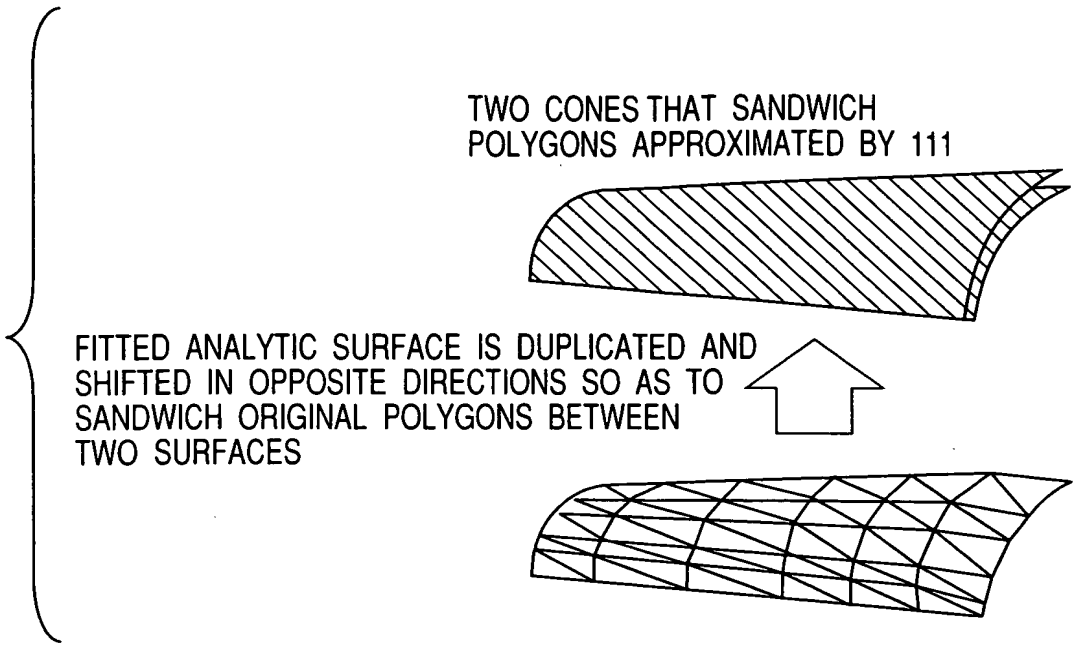
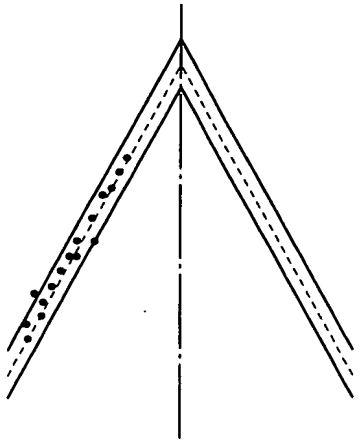
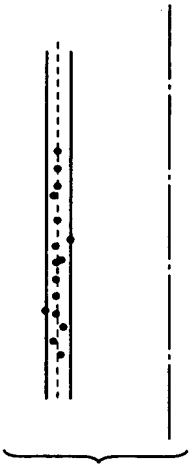


FIG. 30



IN CASE OF CONE
(VERTICALLY MOVE CONE ALONG
AXIS TO SANDWICH IT BETWEEN
TWO SURFACES)

FIG. 31A



IN CASE OF CYLINDER
(SANDWICH BETWEEN TWO SURFACES
BY INCREASING / DECREASING RADIUS)

FIG. 31B